Walgreens Health Initiatives

Health Brief

Diabetes

The more you know about health issues—and your own health in particular, the better you can take care of yourself. This *Health Brief* provides basic health information. To learn more about this topic, please consult your doctor or pharmacist.

Did you know that being overweight increases your risk of developing diabetes? You can reduce your risk of developing diabetes by maintaining a healthy weight and increasing your level of physical activity. If you have been diagnosed with diabetes, you can take steps to manage your condition and help prevent diabetes-related health problems.

Understanding Diabetes

Diabetes occurs when the level of blood glucose, or blood sugar, in the body remains higher than normal. Blood glucose levels cannot be controlled when the body does not produce enough insulin or does not use insulin properly. Very high and very low blood glucose can cause immediate and long-term life-threatening complications. Controlling your blood glucose over time can help prevent these complications.

There are three types of diabetes: type 1, type 2, and gestational diabetes, or diabetes that develops during pregnancy.

- Type 1 diabetes often occurs in young people, but it can develop in people of any age. This type of diabetes is not linked to being overweight or obese.
  - In type 1 diabetes, the body is unable to produce insulin.
  - Everyone with type 1 diabetes must take insulin, usually in the form of injections, or shots.
- Type 2 diabetes is the most common type of diabetes. It is linked to poor food choices and lack of physical activity, which can also lead to being overweight or obese.
  - In type 2 diabetes, the body does not produce enough insulin and does not respond well to insulin.
  - Many people with type 2 diabetes will eventually need to use insulin, in addition to oral medications.
- Gestational diabetes is diabetes that occurs during pregnancy.

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- After delivery, blood glucose levels may return to normal.
- However, 20 percent to 50 percent of women with gestational diabetes will likely be diagnosed with diabetes within five to 10 years.
- Women with gestational diabetes should work closely with their healthcare team to keep their blood glucose in a normal range.

If you do not have diabetes, but your glucose levels are higher than normal, you may be diagnosed with prediabetes, which is also known as impaired glucose tolerance or insulin resistance. Losing weight and increasing physical activity can delay or even prevent progression from prediabetes to type 2 diabetes.

Recognizing Diabetes Risk Factors, Signs, and Symptoms

Type 1 diabetes cannot be prevented, because genes determine whether a person will develop this condition. However, there are ways to prevent type 2 diabetes. Maintaining a healthy body weight and staying physically active can reduce your risk of developing diabetes. Risk factors for type 2 diabetes are shown in Table 1.

Table 1: Risk Factors for Type 2 Diabetes

- Lack of physical activity
- Family history of diabetes
- Prediabetes
- Being overweight or obese
- Race and ethnic background (People of African-American, Asian-American, Latino, Native American, or Pacific Islander descent are at higher risk)
- History of gestational diabetes or giving birth to a baby weighing more than 9 pounds
- High blood pressure
- High cholesterol
- Age 45 years or older
- History of vascular disease

Some people who have diabetes may not notice any symptoms. Diabetes may be detected during routine blood tests, even in people who have no symptoms. Those who do experience symptoms may notice any of the following:

- Extreme thirst
- Frequent urination
- Increased hunger
- Blurry vision
- Irritability
- Tingling or numbness in the hands or feet
- Frequent skin, bladder, or gum infections
- Wounds that don't heal
- Extreme unexplained fatigue, or tiredness

Treating Diabetes

Once you are diagnosed, the goal of diabetes treatment is to control your glucose levels on a daily basis and over time. This can be achieved by making lifestyle changes such as following a healthy diet and staying physically active, and by taking prescription medications, if needed.

Lifestyle Changes

Healthy eating is an important part of controlling your blood glucose. Healthy eating means eating fewer saturated and trans fats, avoiding processed carbohydrates like refined sugar and other sweets, and increasing your fiber intake.

- Look for foods that are steamed, grilled, broiled, boiled, roasted, or poached.
- Avoid or limit foods that are pan-fried, deep-fried, battered, sautéed, or basted.
- Talk with your doctor or a dietitian about the food choices that are best for you.
- Keep your total daily intake of calories within the range you have established with your healthcare team.

Physical activity helps keep your heart and bones strong, relieves stress, and improves your blood circulation. It will help reduce the risk of heart disease and stroke by lowering your blood glucose, blood pressure, and cholesterol levels.

- Most people should aim for a goal of 30 to 60 minutes of physical activity, most days of the week.

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- Any physical activity that gets you moving, such as walking, dancing, or working in your garden, can be good for your health.
- Check with your doctor before you start any exercise program. Your doctor may provide you with special instructions for checking your blood glucose while exercising.

Diabetes Medications

If you have type 1 diabetes, you will need to use insulin. If you have type 2 diabetes, you may need one or more oral or injectable medications. You may also need to use insulin if your blood glucose levels are not well controlled by other medications.

If you need to take insulin, be aware that different types of insulin vary in terms of how long they work, how they are made, and how they are used. Table 2 provides information about the various types of insulin.

- Your insulin dose should be balanced with your meals and physical activity levels. Your doctor will work closely with you to find the right fit.
- It is important to monitor your blood glucose regularly because some insulin may have rapid effects on blood glucose.
- To reach your goal blood glucose levels, it is important to use your insulin as prescribed.
- Ask your doctor or pharmacist about how to take, store, and mix your insulins, if needed.

Table 3 lists other oral and injectable medications used to treat diabetes.

Taking your medication as prescribed is very important in helping you reach your goal blood glucose levels. There are many ways to remember to take your medications. You can use pillboxes, write notes on a calendar, or set an alarm on your watch as a reminder.

Monitoring Your Blood Glucose

Monitoring your blood glucose regularly at home is an important part of your diabetes treatment plan, along with meal planning, physical activity, and medications. It is important to keep your blood glucose as close to your recommended goal as possible.

Blood glucose control may also help prevent or delay the start of diabetes-related complications such as nerve damage, eye problems, kidney disease, heart disease, vascular disease, heart attack, and stroke.

Table 2: Types of Insulin*

Type of Insulin	Brand Names	When It Starts to Work	Peak (when it is most effective)	How Long It Works	Cloudy or Clear
Rapid-acting (lispro, aspart, and glulisine)	Humalog® NovoLog® Apidra®	15 minutes or less	1 to 2 hours	3 to 4 hours	Clear
Inhaled insulin	Exubera®	10 to 20 minutes	2 hours	6 hours	Not applicable
Regular	Humulin® R Novolin® R	30 to 60 minutes	2 to 3 hours	3 to 6 hours	Clear
Intermediate-acting (NPH)	Humulin® N Novolin® N	2 to 4 hours	4 to 10 hours	10 to 16 hours	Cloudy
Long-acting (glargine and detemir)	Lantus® Levemir®	2 to 4 hours	No peak	20 to 24 hours	Clear

* All of these types of insulin, except for Exubera®, are available as prefilled, disposable pens or cartridges. This is not a complete list of insulins available. Consult your doctor or pharmacist for more information.

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Table 3: Other Medications Used to Treat Diabetes*

Class	Generic Name (Brand Name)	How They Work
Alpha-glucosidase inhibitors	• acarbose (Precose®) • miglitol (Glyset®)	Delay the breakdown of starch and the absorption of glucose
Amylinomimetics	pramlintide (Symlin®)	Works with insulin to regulate the entrance of glucose into the bloodstream
Biguanides	• metformin (Glucophage®,Riomet®) • metformin long-acting (Glucophage® XR, Fortamet®, Glumetza™)	Increase sensitivity to insulin and prevent the liver from releasing too much glucose
Dipeptidyl peptidase-4 (DPP-4) inhibitors	sitagliptin (Januvia™)	When blood glucose is high, works to increase insulin produced by the body after meals and decrease the amount of glucose made by the body
Incretin mimetic	exenatide (Byetta®)	• Acts on cells of the pancreas to release more insulin • Reduces glucagon production • Slows absorption of food
Meglitinides	• nateglinide (Starlix®) • repaglinide (Prandin®)	Increase insulin release from the pancreas
Sulfonylureas	• glimepiride (Amaryl®) • glipizide (Glucotrol®) • glipizide long-acting (Glucotrol XL®) • glyburide (Diabeta®, Micronase®)	Increase insulin release from the pancreas
Thiazolidinediones (TZDs)	• pioglitazone (Actos®) • rosiglitazone (Avandia®)	Improve the body's response to insulin
Combination therapies	• glimepiride/rosiglitazone (Avandaryl™) • glimepiride/pioglitazone (Duetact™) • metformin/glipizide (Metaglip™) • metformin/glyburide (Glucovance®) • metformin/pioglitazone (ACTOplus met®) • metformin/rosiglitazone (Avandamet®)	Same as the individual medications

*This is not a complete list of diabetes medications. Consult your doctor or pharmacist for more information.

Monitoring will help you and your doctor:
- Identify trends in your blood glucose control
- Identify factors that may raise or lower your blood glucose levels
- Evaluate the impact of food, activity, or medications on your diabetes
- Identify changes that are needed in your treatment plan
- Decide what you need to do when you are sick
- Confirm whether any symptoms you are having are the result of your blood glucose level or if they are unrelated to your diabetes

Blood glucose monitors and testing supplies can be purchased at your local pharmacy. Ask your doctor or pharmacist to show you how to check your blood glucose. It is common to check your blood glucose several times per day. Your doctor will recommend how often you should check. As recommended by Joslin Diabetes Center, the goal blood glucose ranges for adults with diabetes are:
- 90-130 milligrams per deciliter (mg/dL) before meals
- Less than 160 mg/dL two hours after meals
- 110-150 mg/dL at bedtime

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Figure 1: Sample Blood Glucose Log

The following two examples show completed log entries for a person taking insulin and a person taking oral diabetes medication.

Week of: July 23

	Breakfast				Lunch				Dinner				Bedtime	
Day	Medication	Carbs	Before Time / BG	After Time / BG	Medication	Carbs	Before Time / BG	After Time / BG	Medication	Carbs	Before Time / BG	After Time / BG	Medication	Time / BG
7/23 Mon.:	6 u L	55g	6 am / 123	8:45 am / 179	8 u L	29g	1 pm / 203	3 pm / 139	10 u L	80g	7:30 pm / 73	10 pm / 97	23 u G	
	Activity/Comments: Swimming - 30 minutes at 5 pm. 15 g carbohydrate at bedtime. G=glargine L=lispro													
7/23 Mon.:	500 mg M	45g	7:30 am / 103			70g			500 mg M	61g	6:15 pm / 83	8:30 pm / 184		10:15 pm / 147
	Activity/Comments: Walked 35 minutes at lunch. M=metformin													

Source: Joslin Diabetes Center

Keep a record of your blood glucose values in a log book. Ask your doctor for a log if you do not already have one. Figure 1 shows sample log entries for a person who takes insulin and a person who takes oral diabetes medication.

Additionally, you should have an A1C test two to four times per year. This blood test, performed by your doctor, reflects the average of all your glucose values over the previous two to three months to show your overall glucose control. The goal is to have an A1C less than 7 percent, unless your doctor recommends otherwise.

Preventing Complications

People with diabetes are at risk of developing high cholesterol, kidney problems, obesity, heart disease, stroke, poor wound healing, nerve damage, gum disease, and vision loss. Keeping blood glucose, blood pressure, cholesterol, and weight at goal levels can help delay the onset of diabetes-related complications, slow their progress, and even prevent them. Ask your doctor about taking medications such as aspirin, cholesterol-lowering medications, and blood pressure medications to help prevent or treat some of these health conditions.

Make regular medical visits to doctors experienced in diabetes care to help detect problems or complications early. Your doctor may refer you to specialists, including a foot doctor and an eye doctor, to provide you with the care you need. Your healthcare team can provide you with the appropriate treatment and teach you skills needed for your treatment plan, such as monitoring your blood glucose and examining your feet. Table 4 is a guide to the medical tests and visits you should have and how often to have them.

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Table 4: Routine Medical Tests and Visits

How Often	Exam or Test	Goal	My Result
Every medical visit	Blood pressure	Less than 130/80 mm Hg	
	Feet*	Normal	
	Weight	My goal: _____	
Two to four times per year	A1C	Less than 7%	
	Dental exam	Normal	
Four to six times per year	Fasting blood glucose**	90 to 130 mg/dL	
At least once a year	Complete physical	Normal	
	Dilated eye exam	Normal	
	Feet	Normal	
	Flu vaccine	Not applicable	
	HDL (healthy cholesterol)	• Greater than 40 mg/dL (males) • Greater than 50 mg/dL (females)	
	LDL (unhealthy cholesterol)	• Less than 100 mg/dL • Less than 70 mg/dL if you have heart disease	
	Triglycerides (fat)	Less than 150 mg/dL	
	Urine microalbumin (kidney test)	Less than 30 micrograms (mcg) per mg creatinine	
	Serum creatinine (kidney test)	• 0.9 to 1.4 mg/dL (males) • 0.7 to 1.2 mg/dL (females)	
Once (repeat once if first dose was five years or more before you turned 65)	Pneumonia vaccine	Not applicable	
As needed	Body mass index	Less than 25	
	Waist circumference	Less than: • 40 inches (males) • 35 inches (females)	

*Ideally, your doctor should check your feet at every office visit. Once a year is a minimum. You should also check your feet at home every day.
**You should also check your fasting blood glucose level at home every day.

With help from your diabetes treatment team, you can take control of your diabetes. Use Figure 2 to write down the names and numbers of the members of your healthcare team. Ask your doctor or others on your healthcare team for referrals, if necessary. Your healthcare team is available to support you, help you manage your diabetes, and answer your questions.

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Figure 2: Diabetes Team Telephone Directory

Team Member	Name	Telephone Number
Diabetes doctor		
Nurse practitioner or physician assistant		
Diabetes educator		
Pharmacist		
Dietitian		
Eye doctor		
Foot doctor		
Dentist		
Exercise physiologist		
Social worker or therapist		

Summary

Although there is no cure for diabetes, you can keep your blood glucose levels within your goal range and help prevent diabetes-related complications by doing the following:

- Check your blood glucose levels and know your A1C, blood pressure, cholesterol, and kidney test numbers.
- Follow a healthy meal plan and incorporate physical activity into your daily routine.
- Schedule regular medical visits with your healthcare team.
- Take your medication exactly as prescribed.

By working with your healthcare team to follow these steps, you can control your diabetes and live a healthier life.

Resources

The following organizations can provide you with more information regarding diabetes and its treatment:

Joslin Diabetes Center
One Joslin Place
Boston, MA 02215
800-JOSLIN-1 (800-567-5461)
www.joslin.org

American Diabetes Association
ATTN: National Call Center
1701 N. Beauregard St.
Alexandria, VA 22311
800-DIABETES (800-342-2383)
www.diabetes.org

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American Diabetes Association: Position statement: standards of medical care in diabetes-2007. *Diabetes Care*. 2007; vol 30 (supplement 1): pp S4-S41.

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